

A four-engine military transport aircraft, likely a C-17 Globemaster III, is shown from a top-down perspective, flying over a mountain range. The aircraft is centered in the upper half of the frame. Below it, the acronym 'AQEC' is displayed in large, blue, outlined letters. The background features a prominent, snow-capped mountain peak, possibly Mount Rainier, under a clear blue sky. The foreground shows a blurred landscape with some buildings and trees.

**AQEC**

**Avionics Qualified  
Electronic Component**

# AQEC – WHAT IS IT ?

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A cooperative approach to working with the integrated circuit manufacturers to use their products in applications which require long life, hi-reliability & maintainability

# AQEC – WHY

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- ✈ The Aerospace industry must use commercially available products to manufacture the electronic systems necessary to support a high reliability long product life infrastructure
  - ✈ All commercial products are not suitable for a high reliability long life product
  - ✈ The AQEC program was developed as an approach to obtaining “**information**” from the I. C. manufacturers
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# AQEC – What are the Goals?

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- ✈ Provide AQEC users access to information from the AQEC manufacturers necessary to use commercial-off-the-shelf products
  - ✈ Better enable AQEC users to **access** which of these parts are capable of operating reliably in their applications
  - ✈ Minimize deviations from the AQEC manufacturers standard commercial products
  - ✈ Have minimal impact on the AQEC manufacturers standard operating or business procedures
  - ✈ Promote communication between the AQEC manufacturers and users
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# Typical Avionics Temperature Environment

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- ✈ The predominant user of electronic parts in the aerospace industry is **commercial aviation**
- ✈ All flight critical systems are redundant, typically **triple redundant**
- ✈ Most avionics is located in an environmentally conditioned equipment bay
- ✈ Specified temperature range is -40 to +70 C° with cooling air
- ✈ Data shows that environment is 20-25 C° >95% of the time
- ✈ **-40 to +85 C° parts are adequate and appropriate**

Note: AQEC parts are not expected to necessarily be appropriate for all aerospace applications, **only the majority**

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# Typical avionics radiation environment

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- ✈ Atmospheric neutron radiation **only**
  - ✈ All flight critical systems are redundant, typically triple redundant
  - ✈ Microprocessors, FPGA's and memories are most sensitive parts
  - ✈ Where neutron data is available, most microprocessors and memories are **not adequately fault free**
  - ✈ Data is used to determine how much **avionics system immunity** must be designed into the system
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# WHAT INFORMATION

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- ✈ Part wear out expectations (years)
  - ✈ Effect of atmospheric neutron radiation (upset rate)
  - ✈ Operating temperature vs. failure rate
  - ✈ Maximum temperature for specified performance
  - ✈ Part qualification information
  - ✈ Lead termination material
  - ✈ Counterfeit parts minimization program
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# AQEC – Status of Program

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- ✈ Coordinate with DoD adoption of Mil-Std-3018 Parts management
  - ✈ Working with largest commercial avionics OEM's to insure program is compatible with their needs
  - ✈ AQEC standard revised to:
    - ▢ More accurately describe users needs
    - ▢ Incorporate international community input
    - ▢ More specifically delineate users criteria
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# Commercial Avionics AQEC Opportunities

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Largest user of “Aerospace” parts

- ✈ Principal parts usage is -40 to +85 C° parts
    - ▮ Requirement for parts outside of -40 to +85 C° is “unusual”
  - ✈ Largest commercial avionics OEM’s already collaborating on “common parts” scenario
  - ✈ We are working with the commercial avionics OEM’s to collaboratively define a “common parts” program which includes AQEC.
  - ✈ We will offer this “common parts/AQEC” program to the DoD for their use
  - ✈ Majority of military products use commercial parts
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# International Participation

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- ✈ GEIA-STD-0002-1 (AQEC) supplied to IEC
  - ✈ Circulated to members of TC-107 for comment
  - ✈ Added to TS-62239 as approved part for use in avionics systems
  - ✈ Approved for release as IEC standard
  - ✈ Being released as “Preliminary Available Standard” (PAS) to allow immediate availability
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# OUR GOALS

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- ✈ Your agreement to work with us to develop a successful “common parts/AQEC” program
  - ✈ Your critique of the AQEC standard
    - ▢ Any provisions that the majority of the part suppliers won't agree with are not useful
  - ✈ Suggestions to help make this program successful
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